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ABSTRACT

The purpose of this study was to determine if the Saxon Mathematics series produced gains in math achievement of elementary school students. Mathematics achievement was assessed for 190 students in the Southside School District No. 3, Batesville, Arkansas, using the Stanford Achievement Test Eighth Edition during April 1992 and April 1993. There were four sections of approximately 24 students in each group in grades 2 and 3. One section in each grade received instruction in Saxon Math and the other three sections used the Holt Mathematics series. Mathematics achievement was measured using the total battery score for math which consisted of a composite of three dimensions: Concept of Numbers, Math Computation, and Math Application. Results of the study indicated that students who received Saxon instruction scored significantly higher ($p<.05$) in total battery score in mathematics than students instructed in the Holt series. Based on this study, the use of Saxon Mathematics does produce gains in mathematics achievement of elementary school students. (An appendix contains nine statistical tables.) (Contains 7 references.) (Author)

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A COMPARISON OF SELECTED SECOND AND THIRD GRADERS' MATH ACHIEVEMENT: SAXON VS. HOLT

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OF THE
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RUNNING HEAD: MATH ACHIEVEMENT

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INTRODUCTION

In 1989, the National Council of Teachers of Mathematics (NCTM), as well as many other organizations issued reports citing deficiencies in the mathematics performance of students within the United States. As our society becomes increasingly complex and technological, citizens of the 21st century will need to understand and apply more mathematical concepts than ever before (Willoughby, 1989.) "Mathematics is the key to leadership in a technological society; therefore, uneven preparation in mathematics contributes to unequal opportunity for economic power and stability" (Steen 1989, p. 18). Leder (1991) acknowledged that in recent years there has been a growing dissatisfaction with both the mathematics curriculum and the instructional strategies associated with mathematics. Accompanying the growing dissatisfaction with mathematics programs, educators across the country have sought different methods to improve student math achievement.

In light of the current research concerning the nature of mathematics instruction, the Saxon Program has been designed to address the math deficiencies of students in the United States. John Saxon, a retired military officer, has designed a math series based on the philosophy math is not difficult, it is just different. Concepts are presented to students over an extended period of time concentrating totally on review. Saxon states one of his philosophies by "introducing a topic in increments permits assimilation of one facet of a concept before the next facet is introduced. Both facets are then practiced before a third is introduced." (Saxon 1990, p. 1).

The Saxon textbooks contain approximately 140 daily lessons which must be taught in sequence. Evaluation follows each fifth lesson presented to the student. Adams (1988) identified some effective teaching techniques within the Saxon program such as lecturing less, presenting one concept at a time, cooperative learning, and increased teacher/pupil interaction.

Saxon lessons precede in the following order.

1. Discuss and check homework
2. Optional daily speed quiz
3. New lesson presentation
4. Guided practice - two to six problems
5. Class practice
6. Homework

Many high schools have been using the Saxon series successfully in recent years. In light of reported math achievement gains that have been attributed to the Saxon series, the Southside School District agreed to pilot the Saxon K-3 series in the second and third grade during the

1992-1993 school year to see if it would produce similar results with elementary students.

THE PROBLEM

The problem of this study was to determine if there was a significant difference in the math achievement scores of second and third grade students in the Saxon series compared to second and third grade students in the Holt Mathematics series. As a means of structuring the problem, answers were sought to the following questions:

1. Across both grade levels, was one method any more effective than the other?
2. Did either group have an initial advantage over the other?
3. Was there a difference in post test scores for both grades?
4. For the second grade, was one method any more effective than the other?
5. Did either group have an initial advantage over the other?
6. Was there a difference in post test scores for the second grade?
7. For the third grade, was one method any more effective than the other?
8. Did either group have an inital advantage over the other?
9. Was there a difference in post test scores for the third grade?

RESEARCH METHODOLOGY

SUBJECT

Subjects in the study consisted of 192 second and third grade students enrolled in the Southside School District, Batesville, Arkansas. There were four sections of approximately 24 students in each group in grades two and three. One section in each grade received instruction in Saxon Math and the other three sections used the Holt Mathematics series.

INSTRUMENTS

Mathematics achievement was assesed with the Standford Achievement Test, Eighth Edition (1989) Primary. This test examined student scores in the areas of concept of numbers, math computation, and math applications. The concept of number subtest assessed students' understanding of basic number concepts such as reading numerals, place value, ordering numbers, estimation, fractional numbers, and basic operations. The math computation subtest assessed competency in addition, subtraction, multiplication, and division of whole

numbers; and addition and subtraction of fractions and decimals. The math application subtest assesed the students' ability to apply number concepts and computation. On the SAT, Math Application addressed problem solving, irrelevant data, charts, graphs, probability, geometry, and various units of measurement.

Mathematics achievement was measured using the math achievement total battery score for math which consisted of a composite of the three dimensions; Concept of Numbers, Math Computation, and Math Application.

RESULTS

Nine questions were considered in this study. Each question is stated and a summary of the results of the analysis of data is discussed.

Question #1 asked, "Across both grade levels, was one method any more effective than the other?" As shown in Table 1, this shows that no matter which T-test was used, the Saxon group performed significantly better that the Holt group.

Question #2 asked, "Did either group have an initial advantage over the other?" In Table 2, the Saxon group was actually behind as a group when they began instruction, but actually caught up in performance at the end of the year.

Question #3 asked, "Was there a difference in post test scores for both grades?" As shown in Table 3, there was a significant difference favoring group number one, which is the Saxon group.

Question #4 asked, "For the second grade, was one method any more effecttive than the other?" Table 4 indicates that a significant difference favored group number one which is the Saxon group.

Question #5 asked, "Did either group have an initial advantage over the other?" Table 5 demonstrates that the Saxon group began instruction with a significant disadvantage on the Holt group.

Question #6 asked, "Was there a difference in post test scores for the second grade?" Table 6 indicates there was no significant difference between the Saxon group and the Holt group at the end of instruction.

Question #7 asked, "For the third grade, was one method any more effective than the other?" There was a significant difference favoring the Saxon group. This is shown in Table 7.

Question #8 asked, "Did either group have an initial advantage over the other?" Table 8 indicates that the Saxon group began with a disadvantage over the Holt group.

Question #9 asked, "Was there a difference in post test scores for the third grade?" As seen from Table 9, there was no significant difference between the Saxon group and the Holt group at the end of instruction.

CONCLUSIONS

This study indicated that students who received instruction in Saxon Mathematics made significantly greater gains in total battery scores on the Stanford Achievement Test than did students receiving instruction in the Holt Mathematics series, for both second and third grade students. In addition, the Saxon groups in both second and third grades started behind the Holt group in math achievement according to the pretest scores of the SAT. However, at the end of the instruction period the Saxon group narrowed the gap between the differences and caught up in math achievement. Therefore, this study supported the fact that underachieving math groups could reduce the gap in math achievement by using the Saxon method of instruction.

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Appendix A

STATISTICAL TABLES

Table 1
Variable: Gain

Method	N	Mean	Std Dev
Saxon	48	8.918	20.23
Holt	142	-4.235	13.74

Variances	T	DF	Prob> T
Unequal	4.18	62.3	0.001
Equal	5.04	188.0	0.000

Table 2
Variable: Math 92

Method	N	Mean	Std Dev
Saxon	48	44.65	16.21
Holt	142	54.61	20.00

Variances	T	DF	Prob> T
Unequal	-3.45	99.1	0.0008
Equal	-3.11	188.0	0.0021

Table 3
Variable Math 93

Method	N	Mean	Std Dev
Saxon	48	53.57	12.04
Holt	142	50.17	18.87

Variances	T	DF	Prob> T
Uequal	1.44	128.0	0.1503
Equal	1.17	188.0	0.2433

Table 4
Variable: Gain

Method	N	Mean	Std Dev
Saxon	24	18.33	17.69
Holt	77	-2.07	12.49

Variances	T	DF	Prob> T
Unequal	5.25	30.5	0.001
Equal	6.28	99.0	0.000

Table 5
Variable: Math 92

Method	N	Mean	Std Dev
Saxon	24	35.21	2.35
Holt	77	53.57	2.28

Variances	T	DF	Prob> T
Unequal	-5.59	68.6	0.0001
Equal	-4.25	99.0	0.0000

Table 6
Variable: Math 93

Method	N	Mean	Std Dev
Saxon	24	53.5	2.53
Holt	77	51.5	2.17

Variances	T	DF	Prob> T
Unequal	.61	59.6	0.5422
Equal	.49	99.0	0.6232

Table 7
Variable: Gain

Method	N	Mean	Std Dev
Saxon	48	8.91	2.92
Holt	142	-4.23	1.15

Variances	T	DF	Prob> T
Unequal	4.18	62.3	0.0001
Equal	5.04	188.0	0.0000

Table 8
Variable: Math 92

Method	N	Mean	Std Dev
Saxon	48	44.65	16.21
Holt	142	50.17	18.87

Variances	T	DF	Prob> T
Unequal	-3.45	99.1	0.0008
Equal	-3.11	188.0	0.0021

Table 9
Variable: Math 93

Method	N	Mean	Std Dev
Saxon	48	53.57	12.04
Holt	142	50.17	18.87

Variances	T	DF	Prob> T
Unequal	1.44	128.0	0.1503
Equal	1.17	188.0	0.2433